



News Release

Defense Advanced Research Projects Agency

"Providing technological innovation for national security for over 40 years."

3701 North Fairfax Drive
Arlington, VA 22203-1714

IMMEDIATE RELEASE

April 28, 2003

MICRO AIR VEHICLE POWERED ENTIRELY BY FUEL CELL MAKES DEBUT FLIGHT

On March 21, 2003, DARPA's first entirely fuel cell-powered micro air vehicle, the Hornet, conducted a successful maiden flight in Simi Valley, Calif. The Hornet flew three times for a total endurance of 15 minutes. DARPA believes the Hornet to be the first air vehicle ever to be entirely powered from a fuel cell.

The Hornet uses absolutely no batteries, capacitors, or other sources of energy. The air vehicle's radio system, servos, motor, pumps, and other systems were all powered by the fuel cell, which also acts as the wing structural member. DARPA believes that fuel cell-powered flight may offer the potential for very high endurance missions.

The Hornet is a radio-controlled vehicle with a flying-wing design. The wingspan is 15 inches and the total weight of the fueled vehicle is six ounces. The vehicle uses a combination of off-the-shelf components and a custom fuel cell system, which produces an energy density higher than all similarly sized battery-based systems. During the flight, the average power output of the fuel cell was over 10 watts.

The vehicle's fuel cell is an energy conversion device in which hydrogen, stored onboard the aircraft, reacts with oxygen collected from the airflow over the wing to produce electricity. The fuel cell incorporates a stiff metal mesh that also functions as a mechanical structure to strengthen the wing. The hydrogen is supplied from a unique generator system in which hydrogen is stored in a dry, solid, pellet form, and is released when combined with water, which is also carried in the vehicle. The fuel cell plus hydrogen generator has the potential to achieve a system specific energy of 400 Watt hours per kilogram for this application.

The aircraft is stable and simple to fly using manually operated ground control of the aircraft's throttle, rudder, and elevator surface. The ground controller used an additional radio channel to modulate the rate of hydrogen release in the vehicle. The next generation of Hornet could incorporate a simple autopilot and carry a color video camera payload.

Lynntech Inc., College Station, Texas, designed, fabricated and tested the fuel cell and hydrogen generator. AeroVironment Inc., Simi Valley, Calif., did the air vehicle's detailed design and fabrication and performed the recent flight tests. The two contractors worked jointly

on the air vehicle's initial, conceptual design to best optimize the integration of the innovative fuel cell and hydrogen source into the small vehicle.

The Hornet is being developed under DARPA's Synthetic Multifunctional Materials program, which is exploring materials that combine the function of structure with another critical system function such as power, repair, or ballistic protection. The combination is expected to optimize system performance and realize improved or new capabilities for military systems. The Hornet is the second in a series of micro air vehicles developed in the program. The first micro air vehicle, the Wasp, flew in October 2002, and demonstrated the utility of a multifunctional structure/battery material system (see <http://www.darpa.mil/body/NewsItems/pdf/WASP.pdf>).

-END-

Media with questions, please contact Jan Walker, (703) 696-2404, or jwalker@darpa.mil .